MECHANICS' MAGAZINE,

AND

REGISTER OF INVENTIONS AND IMPROVEMENTS.

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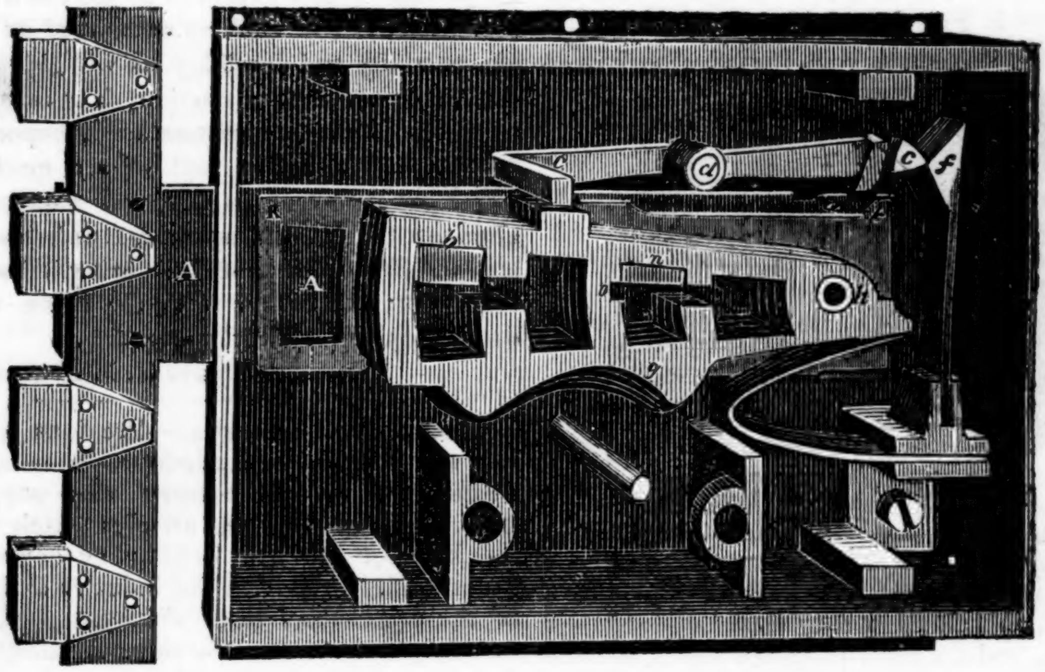
"Without mechanics a general cannot go to war, or fortify a place; and the meanest artificer must work mechanically, or not work at all; so that all persons whatever are indebted to this art, from the king down to the cobbler."—EMERSON.



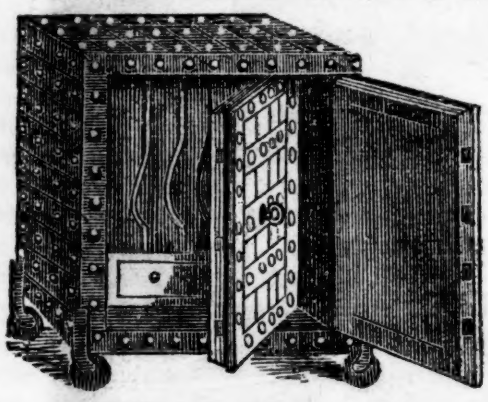
CHUBB'S PATENT LOCK.—The lock made by C. J. Gayler, of 102 Water street, New-York, of which a drawing is annexed, affords more security than any other yet invented, as *it cannot be picked* or opened with any false instrument; and its combinations are so extensive that tens of thousands may be made without making two alike.

Description—A A *a*, the bolt; *b*, the square pin of the bolt; *c c*, the detector, moving on the centre *d*; *f*, the detector spring; *g*, four tumblers, moving separately on the centre *h*, shown lifted by the key to the exact position for the square pin *b* of the bolt to pass, in unlocking. Should one or more of the tumblers be lifted by a pick or false key, in the least degree beyond their present position, the detector, *c c*, being thus overlifted, will, by the angle of the spring, *f*, pressing on the opposite side of the angle of the detector, force its hook into the notch *a* of the bolt, and be firmly held so, until disengaged by the regulating slide, K *k*; in which case, by the introduction of the key, the tumblers are lifted to the regulating combination, and admit the stud *n*, affixed to the regulating slide, to enter the several grooves, *o*, in them; the bevelled end *k* of this slide, by the same movement, pressing against the hook of the detector, disengages it from the notch *a* of the bolt.

It possesses the four principal requisites of a good lock, namely, security, simplicity, strength, and durability; its security, particularly, is increased beyond calculation, by an improvement (the detector) which not only renders it impossible to be picked, but also *detects the first attempt to do so*, thereby preventing those repeated efforts to which all other locks are exposed: at the same time it will be noticed that the thief, in making the attempt, renders the lock more secure, for if the detector is (as it must be in such cases) overlifted, it will force its hook into the bolt, and will there remain until it is disengaged, *which can only be done with the true key*, in the following manner: the key must be turned half way round in the lock in the same way as in locking; then turn back again, and then turn round in the

usual way to unlock. If an attempt has been made to pick the lock, the detector will be overlifted, and catch in the bolt; this circumstance will at once be known, when the true key will not open the lock until the detector is disengaged in the way above mentioned. As to its durability, it is not liable to be injured by constant use; this has been fully ascertained by a lock having been locked and unlocked by steam power *four hundred and sixty thousand times* without receiving the least injury.

Mr. Gayler makes use of this lock in all his Double Fire Proof Chests, of which the annexed engraving is a correct representa-



tion. They have been several times tested by fire, and have afforded perfect security to valuable books and papers. They are now in use in upwards of fifty banks in the United States, as well as in record and other public offices, and for such purposes are preferred to vaults, as they are equally safe against fire, are free from damp, and can be removed from one building to another with little trouble or expense.

On Hussey's Reaping Machine. By Cyrus H. M'Cormick. To the Editor of the Mechanics' Magazine, and Register of Inventions and Improvements.

Rockbridge, Va., May 20, 1834.

Dear Sir,—Having seen in the April number of your "Mechanics' Magazine," a cut and description of a reaping machine, said to have been invented by Mr. Obed Hussey, of Ohio, last summer, I would ask the favor of you to inform Mr. Hussey, and the public, through your columns, that that principle, viz., cutting grain by means of a toothed instrument, receiving a rotatory motion from a crank, with the iron teeth projecting before the edge of the cutter for the purpose of preventing the grain from partaking of its motion, is a part of the principle of my machine, and was invented by me, and operated on wheat and oats in July, 1831. This can be attested to the entire satisfaction of the public and Mr. Hussey, as it was witnessed by many persons: consequently, I would warn all persons against the use of the aforesaid principle, as I regard and treat the use of it, in any way, as an infringement of my right.

Since the first experiment was made of the performance of my machine, I have, for the mutual interests of the public and myself, been laboring to bring it to as much perfection as the principle admitted of, before offering it to the public. I now expect to be able, in a very short time, to give such an account of its simplicity, utility and durability, as will give general, if not universal satisfaction. The revolving reel, as I conceive, constitutes a very important, in fact, indispensable part of my machine, which has the effect, in all cases, whether the grain be tangled or leaning, unless below an angle of 45° to the ground, to bring it back to the cutter, and deliver it on the apron when cut. Very respectfully, yours, &c.,

Cyrus H. M'Cormick.

Trade with America.—Previous to the war which ended in the independence of the United States, that country was supplied from England with most articles which were required for domestic comfort or household decoration. Although the industry and skill of the Americans have subsequently been exerted on home manufactures as substitutes for these foreign commodities, yet such has been the growing prosperity of both countries since that period, that the average annual amount of the exports from England to the United States of America is now much more than quadruple what it was between the years 1750 and 1760.

The official value of the medium annual exports to the whole of the Americas, both North and South, between the years 1749 and 1755, was £2,001,690; between the years 1784 and 1792, £5,605,626; in 1830, £21,117,014. For the United States alone, the exports from this country, in 1830, were £8,236,677; and if to this amount be added £2,619,562, the value of the exports in the same year, to the British possessions in North America, the value will be £10,856,239. This amount is nearly equal to the £10,915,778, which was the total amount of exports from England in 1760, to all parts of the world except India and China: the value of the exports to the latter places only amounted to £736,358.

The almost entire dependence of the British North American colonies upon the parent country for a supply of almost every

article of commerce and luxury, is curiously illustrated by an order sent to Glasgow for supplies for General Washington's family, in the general's own hand-writing, and dated the 20th of September, 1759.* We think this document will be found of interest, not only as illustrating the character of some part of our trade with America at the early period to which we have alluded, and as showing the relative position of the two countries with regard to arts and manufactures previous to their dismemberment, but as exhibiting a great public character interesting himself in family arrangements, and in the minute details of private life. It will be remembered, that with the same hand which on this occasion penned an order for a ribbon to adorn his wife, and barley sugar for his children, he had a few years after to sign the treaty of peace, whereby the independence of his country was fully recognised.

"2 beaver hats, plain, each to cost a guinea; 1 sword-belt, of red morocco leather, or buff—N. B., no buckles or rings; 4 lbs. of ivory blacking; 2 best two-bladed knives; 1½ reams of paper; 2 flowered lawn aprons; 2 pair of woman's white silk hose; 6 pair of fine cotton ditto; 4 pair thread ditto; 1 pair black and 1 pair white satin shoes of the smallest sizes; 6 pair woman's best kid gloves; 6 pair ditto mittens; 1 black mask; 1 dozen most fashionable pocket handkerchiefs; 2 pair neat small scissors; 1 lb. sewing silk, shaded; 4 pieces binding tape; 19 M. pins (different sizes); 3 lbs. Scotch snuff; 3 lbs. best violet Strasburgh; 1 piece white satin ribbon, pearl edge; 1 case of pickles; 1 large Cheshire cheese; 4 pounds green tea; 10 gross best corks; 1 hhd. best porter; 10 loaves of double and 10 of single refined sugar; 3 snaffle bridles; 9 best girths; 25 pounds brown soap; 2 dozen packs playing cards; 2 sacks best English oats; 1 dozen painter's brushes; 12 best hand padlocks; 18 bell-glasses for garden; more chair bottoms, such as were wrote for in a former invoice; 1 more window curtain and cornice; busts of copper enamel, or glazed, viz., of Julius Cæsar, of Alexander the Great, of Charles XII. of Sweden, and another of the King of Prussia—these all to be of the same size, in order to fill up broken pediments over doors, and not to exceed 15 inches in height nor 10 inches in width; Prince Eugene and the Duke of Marlborough, of somewhat smaller size than the above; sundry small ornaments for a chimney-piece that is 6 feet long and eight inches broad; 100 lbs. white biscuit; two lanterns; various cloths (as specified), with buttons and thread, enough to make up into clothing; 40 yards coarse jean or fustian for summer frocks for negro servants; 1 piece dowlass at 10d.; ½ dozen pair coarse strong thread hose for negro servants; 450 ells Osnaburgs; 350 yards of Kendal cotton; 100 yards Dutch blankets; 20 lbs. brown thread; 20 sacks of salt; a large quantity of different kinds of nails (specified); 2 dozen best staples; sets of cooper's and joiner's tools; 5 lbs. white sugar candy; 10 lbs. brown ditto; 1 lb. barley sugar; a large quantity of drugs and horse medicines of different sorts (specified)."—[Penny Mag.]

* The list has already been published in Dr. Cleland's "Statistical Account of Glasgow," having been taken from Mr. Dugald Bannatyne's "Common-place Book," into which it had been transcribed from the original document. We have been obliged by our limits to abridge it greatly.

Indian Rubber Carpets.—Having some Indian rubber varnish left, which was prepared for another purpose, the thought occurred to me of trying it as a covering to a carpet, after the following manner. A piece of canvass was stretched and covered with a thin coat of glue, (corn meal size will probably answer best,) over this was laid a sheet or two of common brown paper, or newspaper, and another coat of glue added, over which was laid a pattern of house papering, with rich figures. After the body of the carpet was thus prepared, a very thin touch of glue was carried over the face of the paper to prevent the Indian rubber varnish from tarnishing the beautiful colors of the paper. After this was dried, one or two coats, (as may be desired,) of Indian rubber varnish were applied, which, when dried, formed a surface as smooth as polished glass, through which the variegated colors of the paper appeared with undiminished, if not with increased lustre. This carpet is quite durable, and is impenetrable to water or grease of any description. When soiled, it may be washed like a smooth piece of marble or wood. If gold or silver leaf forms the last coat, instead of papering, and the varnish is then applied, nothing can exceed the splendid richness of the carpet, which gives the floor the appearance of being burnished with gold, or silver. A neat carpet on this plan will cost (when made of good papering,) about 37½ cents a yard. When covered with gold, or silver leaf, the cost will be about $1.00 or $1.50 a yard.

American Mangle.—This instrument, invented and patented by Mr. I. Doolittle, of Bennington, Vt., we have seen used, and we have conversed also with those who have employed it, and find that its use saves a

great portion of the labor, and all the fuel usually employed in the process of ironing table and bed linen, towels, &c., besides being much more expeditious, and giving the articles a better lustre and whiter appearance. It is regarded as a valuable auxiliary, and by some is reckoned among the indispensable utensils of the laundry.

The New Pin.—There are few things which more strikingly exemplify the high point of civilization to which this country has attained than the amount of capital continually expended, the inventive talent exercised, and the powerful agencies employed, as the remedy of exceedingly small evils, and the attainment of equally minute objects of convenience. This remark cannot perhaps find a better illustration than in "The New Pin with an Immoveable Solid Head." The defect in the old pin, which it is the object of the present improvement to remedy, is that the head of the pin being separately spun and then put on, was liable to be detached by the pressure of the thumb. The principle of the improvement consists in this: that the head being formed of the same piece with the body of the pin, the inconvenience attending its slipping is effectually prevented. This is the minute improvement in a minute article, the accomplishment of which has cost the patentees several years of attentive application, and the expenditure of a large capital, according to their own statement, which, when the extent and character of the machinery employed are considered, there can be no reason to doubt. At the same time, it must be taken in connection with this improvement, that the patent pin is altogether produced by machinery, instead of partly by hand processes. "The Patent Solid-headed Pin Works" are situated about a mile from Stroud, on the Bath and Birmingham road. The principal building consists of five floors, each of them one hundred feet in length, and completely filled with machinery. A large iron water-wheel, on which a stream acts with a power equal to that of forty horses, gives motion to all the mechanical apparatus, which is so ingeniously constructed as to perform every essential operation for converting a coil of wire into the perfect pin with scarcely any noise and little apparent effort. Upon the old system, this comparatively insignificant article had to go through fifteen or sixteen hands before it was finished; but this curious machine effects the whole without manual assistance, or any extraneous aid whatever; for the wire being placed on a reel, and the machine set in motion, all the mechanical combinations, so numerous and dissimilar in their movements, are simultaneously performing their various functions with a rapidity and precision truly surprising. While one portion of the apparatus is drawing out and straightening the wire, and cutting it off at the required length, another combination is pointing and polishing the pin, and another compressing a portion of the wire into dies to form a perfect and neat round solid head. The various movements are completely at command, and susceptible of instant alteration and adjustment to pins of any length, and heads of any form, while the machine is working at its ordinary speed. Each machine operates on four wires at once, and from forty to fifty pins are with facility produced in a minute by each of the 100 machines which are completed, and in constant operation at the works. As a more particular detail of the process would not be well understood without engravings, we shall only further state that the works, with the present number of machines, are capable of producing upwards of two tons of pins weekly, or, stating the amount numerically, 3,240,000 pins daily, 19,440,000 weekly, supposing all the machines to be in operation twelve hours daily. It is stated that altogether twenty *millions* of pins are daily manufactured in this country for home consumption and for the foreign market.—[Penny Mag.]

Stereotype Metalagraphic Printing.—*By Dr. Alexander Jones, of Mobile, Alabama.*—I offer this name, as I have nothing better to designate it. It means simply the transferring of printed letters, from the pages of a book, or newspaper, to the polished surfaces of metallic plates, especially of soft iron. My experiments are not yet completed, yet I feel satisfied that the result is entirely a practicable one, if carefully conducted with proper instruments.

The best plan on which to conduct the experiment is as follows: Take two plates of very soft iron, of moderate dimensions, give one face of each a very true and fine polish, so that when applied by these faces, they shall uniformly fit and adhere together. Moisten two slips of printed newspaper, or parts of a leaf from a book, of the size of the plates, apply one to the polished face of each plate, and interpose between them a fold or two of silk paper, and then clamp the plates together. Give them a gentle heat over the fire, then place them in a vice, and apply a strong screw power. On separating them and gently removing the paper, the letters will be seen, distinctly formed on the faces

of the two plates. Now, as printer's ink is formed of *lamp-black and oil*, upon which acid acts very little, the faces of the plates may be slightly touched over with diluted sulphuric or nitric acid, which, if skilfully applied, acts on the iron, and leaves the letters raised. When the printer's ink contains some bees-wax, the experiment is more complete. These plates, once formed, may be converted into steel, on the plan of Mr. Perkins; after which they would probably print from 10,000 to 20,000 copies without being materially defaced. An expert mechanic, with proper machinery, could in a day or two form a sufficient number of plates to print off 20,000 copies (500 pages) of an octavo volume.

Other metals, as copper, brass, and type metal, with slight variations, can all have letters transferred to them in the same manner, and can be used as printing plates; but none of these will have the durability of iron. —[American Journal of Science.]

THE LOCUST.—The locust belongs to that class of insects which naturalists distinguish by the name of *gryllus*. The common grasshopper is of this genus, and in its general appearance resembles the "migratory locust," of which we have to speak. The body of this insect is long in proportion to its size, and is defended on the back by a strong corslet, either of a greenish or light brown hue. The head, which is vertical, is very large, and furnished with two antennæ of about an inch in length: the eyes are very prominent, dark, and rolling: the jaws are strong, and terminate in three incisive teeth, the sharp points of which traverse each other like scissors. The insect is furnished with four wings, of which the exterior pair, which are properly cases to the true wings, are tough, straight, and larger than those which they cover, which are pliant, reticulated, nearly transparent, and fold up in the manner of a fan. The four anterior legs are of middling size, and of great use in climbing and feeding; but the posterior pair are much larger and longer, and of such strength that the locust is enabled by their means to leap more than two hundred times the length of its own body, which is usually from two to three inches. Locusts, as the writer of this article has seen them in the East, are generally of a light brown or stone color, with dusky spots on the corslet and wing-cases; the mouth and inside of the thighs tinctured with blue, and the wings with green, blue, or red. These wings are of a delicate and beautiful texture; and in the fine fibres, by which the transparency is traversed, the Moslems of western Asia fancy that they can decypher an Arabic sentence, which signifies "We are the destroying army of God."

The female locust lays about forty eggs, which in appearance are not unlike oat-grains, but smaller. She covers them with a viscid matter, by which they are sometimes attached to blades of grass, but are more usually deposited in the ground. For this purpose she prefers light sandy earths, and will not leave the eggs in compact, moist, or cultivated grounds, unless she has been brought down on them by rain, wind or fatigue, and rendered incapable of seeking a more eligible situation. Having performed this, the female dies; and the eggs remain in the ground throughout the winter. If much rain occurs, the wet spoils them, by destroying the viscid matter in which they are enveloped, and which is essential to their preservation. Heat also seems necessary to their production, for the little worm which proceeds from the egg sometimes appears so early as February and sometimes not until May, according to the state of the season. This, in the usual course, becomes a nymph, in which state it attains its full growth in about twenty-four days. After having for a few days abstained from food, it then bursts its skin, comes forth a perfect animal, and immediately begins to unfold and trim its wings with the hinder feet. The insects which first attain this state do not immediately fly off, but wait in the neighborhood for those whose developement is more tardy; but when their army is formed, they take their flight from the district.

To those who have not seen a flight of locusts, it is difficult by description to convey an idea of the appearance it presents. As seen approaching in the distance it resembles a vast opaque cloud, and as it advances a clattering noise is heard, which is occasioned by the agitation and concussion of wings in their close phalanxes. When they arrive they fill the air, like flakes of thick falling snow; and we have known the bright and clear sky of Chaldea become darker than that of London on some heavy November day.

Wherever they alight, every vegetable substance disappears with inconceivable rapidity before them. The most beautiful and highly cultivated lands assume the appearance of a desert, and the trees stand stripped of all their leaves as in the midst of winter. After devouring the fruits, the herbage, and the leaves of trees, they attack the buds and the bark, and do not even spare the thatch of the houses. The most poisonous, caustic, or bitter plants, as well as the juicy and

nutritive, are equally consumed; and thus "the land is as the Garden of Eden before them, and behind them a desolate wilderness." It seems as if nothing could appease their devouring hunger, and the energy and activity they exhibit, and the rapidity of their operations, almost exceed belief. Their depredations are not confined to the open air; they scale the walls, and penetrate to the granaries and houses. They swarm from the cellar to the garret, and, within doors and without, they are a terrible nuisance, for they are continually springing about, and often, in consequence, give a person startling raps on different parts of the face, affording very sensible evidence of the force with which they leap; and, as the mouth cannot be opened without the danger of receiving a locust, it is impossible to converse or eat with comfort. When they have settled themselves at night, the ground is covered with them to a vast extent; and, in some situations, they lie one above another several inches thick. In travelling, they are crushed beneath the feet of the horses; and the animals are so terribly annoyed by the bouncing against them in all directions of the insects they have disturbed, that they snort with alarm, and become unwilling to proceed.

It is not merely the living presence of these insects which is terrible, but new calamities are occasioned by their death, when the decomposition of their bodies fills the air with pestilential miasma, occasioning epidemic maladies, the ravages of which are compared to those of the plague. Thus famine and death follow in their train; and instances are not of rare occurrence in the East in which villages and whole districts have been depopulated by them.

Under these circumstances it necessarily becomes an object of anxious attention, in the countries they are most accustomed to visit, either to prevent them from alighting on the cultivated grounds, or to drive them off or destroy them after they have descended.

The impression is very general that noise frightens these insect devastators, and prevents them from alighting. When, therefore, the people are aware of the approach of their armies, every kettle or other noisy instrument in the place is in requisition, with which, and by shouts and screeches, men, women, and children, unite in the endeavor to make the most horrible din in their power. The scene would be truly laughable, from the earnestness which every one exhibits in this strange employment, were not all disposition to mirth checked by the consciousness of the fearful consequences of the invasion which it is thus endeavored to avert.

How far noise may really operate in preventing their descent in ordinary circumstances, it is not easy to ascertain; but on the approach of evening, or when exhausted by their journey, nothing can prevent them from alighting. They will then descend even on the seas and rivers, of which some striking instances are recorded.

When a swarm has actually alighted, the means employed to drive them off are much the same as those to prevent their descent. But this is never attempted in wet weather, or until the sun has absorbed the dew, as the locust is quite incapable of flying while its wings are wet. When the swarm is large, or when it has come down on cultivated grounds, no measure of destruction is practicable without sacrificing the produce; but when the depredators have been driven to waste grounds, or happened in the first instance to descend upon them, various modes of extirpation are resorted to, of which the following is most effective: a large trench is dug from three to four feet wide, and about the same depth; the off side is lined with people furnished with sticks and brooms, while others form a semi-circle, which encloses the extremities of the trench, and the troop of locusts, which are then driven into the grave intended for them by the clamorous noises we have already described. The party stationed on the other side push back such insects as attempt to escape at the edges, crush them with their sticks and brooms, and throw in the earth upon them.

These insect devastators have fortunately a great number of enemies. Birds, lizards, hogs, foxes, and even frogs, devour a great number; and a high wind, a cold rain, or a tempest, destroys millions of them. In the East they are used as an article of food. In some parts they are dried and pounded, and a sort of bread is made, which is of much utility in bad harvests. They are sold as common eatables in the bazaar of Bagdad, and the cooks of the East have various ways of preparing them for use.—[Penny Magazine.]

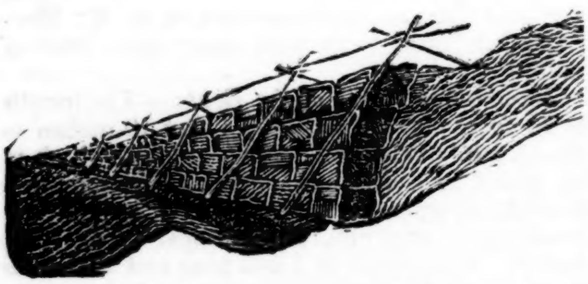
Chaptal.—This distinguished chemist and statesman was a successful husbandman.]

"When, shortly afterwards, he retired to private life, he again devoted his time to studies. In the beet manufacture, he spent a large portion of his fortune, and he fed a large number of animals, as, for instance, 1,200 merino sheep, of the finest wool, with the residue of the beets. He increased, by his agronomical improvements, the value of his property so much, that the nett proceeds, which were fourteen thousand francs, amounted afterwards to sixty thousand."

A Cheap Method of making Fence of a Durable Character. By L. M. T. [From the New-York Farmer.]

If the ground be inclined in a direction opposite to that of the fence, begin by turning three or four furrows with a side-hill plough down hill; let them be thrown by the spade up the hill; plough three or four more on the same ground, and let them be thrown above the others; the ground will then present this shape—

Pick up your paving stones, if you have no better, or quarry about half as many as are requisite to make an ordinary 3½ feet wall, and place them against the bank formed until you have a fence four feet high, and from nine to fifteen inches thick, and what is better, one which will not fall down, and which has been tested by the writer of this article to resist the frost, when all other methods of making stone walls have failed. The bank must incline one foot in the four, or four and a half, of height. This fence is made at less expense by one-half of stone and one-third of ordinary wall in the price of laying. If designed to stop sheep, it must be staked and sided in this shape—



The same fence can be made on level ground, and has been by myself, when it will present nearly the above profile, staked and sided, and is effective against both sheep and cattle. L. M. T.

Hoosick, Rensselaer co., March 21, 1834.

Years.—The word Year is purely Saxon, and is supposed by some to be derived from *æra:* whilst others deduce both words from the Greek *ear*, or Latin *ver* (Spring); because many of the ancients were in the habit of dating the commencement of the year from spring. In the Hebrew, Greek, and Latin languages, the word *year* is expressive of a ring or *circle*. The Egyptians also represented it by a snake placed in a *circular* position, with its tail in its mouth; whence, perhaps the name of the *Zodiac*, or that *imaginary* circle which is made by the sun in the heavens, during the twelve months. The time in which the sun performs its journey through the twelve *signs* of the Zodiac comprehend 365 days, 5 hours, 48 minutes, and 48 seconds, and is therefore styled the Natural, Solar, or Tropical Year. The Sidereal, or Astral year, is the time which elapses from the sun's passage from any particular fixed star, until its return to it again, and is just twenty minutes and twenty-nine seconds longer than the natural or solar year. The Lunar year consists of twelve lunar months, or that period during which the moon passes twelve times through its various phases, or changes. The common or civil year, in use with us and established by law, contains 365 days during *three successive years*, but in each *fourth* year an *intercalary* or additional day is inserted, in order to make up the number 366, such additional day being considered equivalent to the time lost by not counting the five hours and forty-nine minutes at the end of each of the four years, from one Bissextile or Leap year to another. The word *leap* sufficiently explains the act of passing over the hours in question. This plan was invented by Julius Cæsar, or by Sosigenes, the Egyptian mathematician, who assisted him in rectifying the Calendar. The additional or *intercalary* day is with us always placed in the month of February, which consequently in *Leap Year* consists of twenty-nine days, the usual number being twenty-eight. Cæsar placed it in the month of March, by reckoning the sixth day of the calends of that month *twice over*, hence the term *Bissextile*, from the words *bis* (twice) and *sex* (six), or *sextilis* (sixth day). But by the Gregorian alteration, the fourth year coming at the close of a century is not a leap year, unless the number of hundreds be a multiple of four. Thus 1600 was a leap year, 1700 and 1800 were not, 2000 will be. The reckoning of time by the course of the sun or moon was attempted in various ways by different ancient nations; but they, finding that their minor divisions of time did not correspond with the courses in question, endeavored to prevent confusion by ordaining a certain number of days to be *intercalated*, or inserted, out of the common order, so as to preserve the equation of time. The *Egyptian* year (as used by Ptolemy) consisted of 365 days, which were divided into twelve months of thirty days each, besides five *intercalary* days at the end. The Egyptian *Canicular*, or *natural* year, was computed from one *heliacal* rising of the star Sirius, or *Canicula*, to the next. By the regulation of Solon, the ancient *Greek* year was *lunar*, and consisted of twelve months; each containing thirty and twenty-nine days, alternately; and, in every revolution of nineteen years, the third, fifth, eighth, eleventh, sixteenth, and nineteenth, it had an *intercalary* month, in order to keep the New and Full Moons to the same seasons of the year.

The ancient *Jewish* year was the same as the Greek one, only that it was made to agree with the Solar year by adding eleven and sometimes twelve days at the end; or an *intercalary* month when necessary. The modern *Jewish* year consists of twelve lunar months generally; but sometimes of thirteen, that is, when an *intercalary* month is inserted. The *Turkish* year consists of twelve lunar months of thirty and twenty-nine days alternately, sometimes of thirteen. The ancient *Roman* year, as settled by Romulus, was *lunar*, but contained only ten months, which were irregular, and comprehended 304 days in all; being a number fifty days short of the true *lunar* year, and sixty-one days of the *solar*. Romulus added the requisite number of days at the end of the year. Numa Pompilius added two months, making the year to consist of 355 days, thereby exceeding the *lunar* year by one day, but being short of the *solar* one by ten days. Julius Cæsar, during his third consulship, and whilst he was Pontifex Maximus, or high priest of Rome, reformed the calendar by regulating the months according to their present measure, and adding an intercalary day every fourth year to the month of February; but he being assassinated before his plan could be fully brought into operation, the Emperor Augustus perfected and established what his kinsman had begun. The *Julian* year, which consisted of 365 days and 6 hours, was, however, still incorrect; for it was found to be too long by about 11 minutes, which in 131 years would be equal to one day; consequently, there was a further reformation of the calendar by Pope Gregory, in the 1582. He cut off eleven days, by calling the fourth of October the fifteenth. This alteration of the *style* was gradually adopted in the several countries of the European continent; bnt in Russia, in some of the Swiss cantons, and in the countries of the East, the *old style* is still preserved. The Parliament of England adopted the *Gregorian* plan, in 1752, by enacting that eleven days should be *omitted* that year, all dates therefore, previous to 1752, are said to be according to the Old Style: whilst those since that period are deemed to be according to the New Style. In 1800, which was properly a bissextile, or leap year, the intercalary day was omitted; hence, the difference between the old and new style is now twelve days. The *Gregorian* regulation does not absolutely preclude all error in future; but that is likely to be so trifling, as not to require particular attention. The beginning of the year has by no means been the same in different ages and countries. The Chaldeans, the Egyptians, and the Jews, in all civil affairs, began it at the *autumnal equinox*. The ecclesiastical year among the Jews, the common year of the Persians, and of the Romans under Romulus, commenced in spring: a mode still followed in many of the Italian states. Both the *equinoxes*, as well as the *summer solstice*, were each the commencing date in some of the states of Greece. The Roman year, from the time of Numa, began on the calends of January; the Arabs and Turks compute from the 16th of July; the christian clergy formerly commenced the year on the 25th of March *—a method observed in Great Britain, generally, in civil affairs, until 1752; from which period our civil year has begun on the 1st of January, except in some few cases, in which it still commences on the "Day of Annunciation," or the 25th of March. In Scotland, the year was, by a proclamation, bearing date so early as the 27th of November, 1599, ordered thenceforth to commence in that kingdom on the 1st of January, instead of the 25th of March. The English Church, still, in her solemn service, renews the year on the *First Sunday in Advent*, which is always that next to or on *St. Andrew's Day*. Our ancestors, after the establishment of Christianity, usually began their year at *Christmas*, and reckoned the commencement of their *æra* from the incarnation, or birth of Christ. William the Conqueror, however, introduced the method of substituting the first year of his own reign for the Christian æra. At subsequent periods, the English reverted to the ancient custom; but all State proclamations, patents, charters, and acts of Parliament, have continued to be dated from the commencement of the reigns of the respective sovereigns, with the addition of the words, "and in the year of our Lord," &c. The Russian government did not adopt the Christian æra until the time of Peter, in 1725; their previous had been to reckon from the world's age, or the *year of the creation.*

The Paisley Canal Passage-Boats. By James Whitlaw. [From the London Mechanics' Magazine.]

Sir,—As your correspondents have been requested to forward to you information respecting the light gig-shaped boats lately introduced upon canals, I send you the following account of the Paisley canal passage-boats, from which account I think it will be seen that the *skiffing*, or *rising to the surface of the water principle*, so much insisted on by Mr. Macneill, has little to do with their quick rate of sailing.

Description of one of the Boats.—The length is 70 feet, width 6 feet, and 1 foot 10 inches is the depth. With ninety passengers, which is as many as a boat can conveniently take, the draught of water is 19¼ inches; when all the passengers are out, the draught is only 5½ inches. The rudder is 2 feet long and 20 inches deep, and its bottom is in a line with the under side of the keel. The weight of the iron work is 17 cwt.; and the weight when the boat is finished is 33 cwt. The following figure is a side view of one of the boats. The windows in front light the cabin, and those behind are for the steerage. The part at the bow marked 8 feet is a deck for the passengers, and the part marked 6 feet has seats round it. The 6 feet towards the stern is for the same purpose as the 6 feet in front, and the 7 feet is a deck on which the steersman stands; under each

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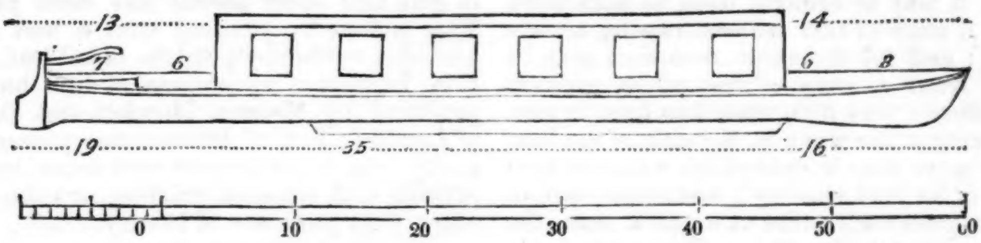
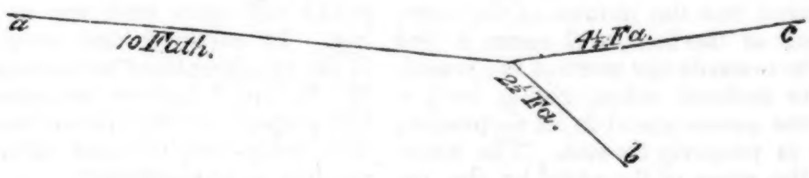
* The Church of Rome dated from the Sunday succeeding the full moon which occurred next after the vernal equinox; or, if the full moon happened on a Sunday, the new year commenced on that day.



deck is a place for any light luggage. The keel is 35 feet long; the part in front (under the boat) marked 16 feet, and that behind, marked 19 feet, have no keel—this allows the boat to turn quicker. A line stretched from the highest point in the bow to the highest point in the stern would rise about 6 inches above the lowest part of the gunnel. The depth of the keel is 5 inches; and this depth did not form part of the measures given above, of the draught of water, and the depth of the boat. The plates are of 16th wire-gauge. The ribs are made of light gunnel-iron; and a rim of the same goes round the inside of the top edge of the boat, on which the wooden gunnel is fixed by means of square-headed screws. There are light ribs of wood laid inside of the boat, on which the flooring is nailed, and a broad stripe of wood runs between the seats and the windows, so high that the passengers may rest their backs upon it. The cotton oiled cloth, which covers the cabin and steerage, requires three very thin coats of boiled oil to make it water-tight, and it should be dried in the sun if possible: very light curved ribs, set about two feet apart, support the cloth overhead, and it is fixed to the frames of the windows, &c., at the sides of the boat. A boat of this kind can be finished in a most comfortable style for £130. The cost of the iron-work is £70, and £60 will pay the joiner and other work of the boat.

The hooks (there is one on each side), on which the towing-line is fixed, are fastened to the gunnel of the boat at about 15 feet from the bow; the rope is put on one of these, when the boat is not very much loaded, but when there are a great many passengers, the rope is fixed about 3 feet 6 inches nearer the bow; this helps the boat round the turns on the canal. The shape of the hook is as represented in the following sketch, to prevent the rope, any time it slacks, from falling off.

As the Paisley canal is a very winding one, the longest towing-line that can be used on it is as follows:



a, is the end connected to the boat; *b*, is fixed to the one horse, and *c*, to the other. If the rope were longer than this, it would draw the boat against the side, at a quick bend on the canal. The horse in front has blinders on it, and a boy rides on the one behind. The harness must be as light as possible. If the horses are run 12 miles a day, they keep in excellent order, but 16 miles per day is too much for them. The horses are changed every 4 miles. Half blood horses, or a breed between half blood and full blood, answer best.

The canal is 30 feet wide, except at the bridges, where it is only 11 feet, and there are two or three more contracted places on it, of considerable length. The average depth of the canal is 4 feet 6 inches. The sides of the canal are lined by a *perpendicular wall*, built of small stones, which goes 10 or 11 inches below the surface of the water, and as much above it. The distance from Glasgow to Paisley is 7¾ miles by the canal, and the distance from Glasgow to Johnstone is more than 11 miles. The boats run the distance between Glasgow and Paisley in 50 minutes, and take in and put out a good many passengers at different places on the way; and the distance from Paisley to Johnstone is run over in a time proportionably short. The cabin fare is 9d., and the steerage fare is 6d., from Glasgow to Paisley. When passengers go from Glasgow to Johnstone, they are charged 1s. in the cabin, and 9d. in the steerage.

The best speed for the Paisley canal boats is greater than 9 miles an hour; and this velocity occasions a very little and gradual swell, not more than 7 inches high on the canal; there is no wave whatever at or before the bow of the boat, and the water is lower than the surface of the canal just behind the bow; it then begins to rise, and the wave reaches it maximum elevation at about two-thirds of the length of the boat from its bow; at the stern the elevation of the wave is nothing, and any ripple that follows the boat is occasioned by the action of the rudder to turn the boat. At the best velocity the horses have not a heavy pull; but when the boat is drawn so slow as 6 or 7 miles an hour, the strain on the towing-line is very great, and waves rise in front of the boat more than 18 inches high, and wash over the banks of the canal. On account of the boat's being

so light, it may be brought from its maximum speed to a state of rest without raising a wave in front; and for the same reason it may be brought from a state of rest to its greatest speed before a very high wave has time to rise. At the bridges the wave at the side of the boat is rather more than 9 inches high when the boat is going at its best velocity; and when two of the boats pass each other at a quick rate, the wave is not worse than this. When two boats pass, the horses of one of them stop just before they come opposite the horses of the other boat, and a boatman takes the tow-line off its hook and holds it, in case it should come in contact with the bottom of the other boat, which is passing it at its full speed. As far as I know, no accident has happened since these boats have been put upon the canal, and the trade has increased very much.

When the speed of the boat is low, the waves rise and get a great way ahead of it; if the velocity is increased to a certain extent, the boat keeps up to the wave; and if it sail quicker still, the bow gets before the swell, which decreases in height as the velocity of the boat increases —in the highest velocities, at least, that I have seen the boat brought up to. From this it would appear that the wave has a determinate velocity, like the undulations that cause sound —at any rate, it has a maximum velocity: and if the whole cause of the formation of the wave continues when the boat goes quicker than its motion, the wave will fall behind. Now, there is a vacuum formed towards the stern of every vessel when it is sailing; this, together with the height at which the wave stands above the level of the canal, and the motion of the wave in the direction of the boat, will cause it (the wave) to fall in towards the stern of the vessel, and act on its inclined sides, giving back a great part of the power spent in its formation, if the vessel is properly formed. The water sent towards the sides of the canal by the inclination of the bow, will be reflected from the perpendicular facing on the banks, and act in the same way. The *lateral communication of motion* among particles going in different directions may have a tendency to keep down the swell. If this explanation is correct, the boats must have their dimensions and form corresponding to the width of the canal, and the velocity they are to sail at.

As the boat *rises* on the wave, its bow is up or down, according as the wave is fore or aft.

I am, Sir, yours, &c.

James Whitlaw.

Illuminated Printing.—In many of the old printed books, the initial letters, and occasionally other parts, were printed in red. This was done by two workings at press, and was an imitation of the earlier fashion of *illuminating* manuscripts. The practice is still followed in some almanacs, the saints' days and holy-days being "red-letter days." Some ingenious contrivances have been devised for working in various colors; and a few years since, a curious book was written and published on the subject by Mr. Savage. Still more recently, printing in gold and other metals has been practised. This is done by printing with a sort of size, and afterwards applying the metal leaf. Some very handsome specimens of this have been produced by Messrs. Howlett and Brimmer, of London; but, of course, the process is too costly and too tedious ever to enter into competition with common printing, or to be used for other than purposes of luxury.

Valuable Discovery in the Fine Arts.—Mr. Mudie, well known as an able literary compiler, has brought out a popular work on "the feathered tribes of the British Island," in which, amongst other attractive features, the vignettes on the title pages are novelties, being the first successful specimen (says Mr. Mudie) of what may be called Polycromatic printing, or printing in many colors from wooden blocks.

"By this method," he adds, "every shade of color, every breath of tint, every delicacy of hatching, and every degree of evanescence in the outline, can be obtained; and fifty thousand fac similes of a painting may be produced with perfect uniformity and at moderate expense. The advantages to books, of which a large number is to be sold, will be very great, not only as removing the cost of tinging by hand, which is the same for the last thousand as the first, but by making the copies more alike and more durable, and rising more above the reach of the ignoble pecus of imitators. In these vignettes, Mr. Baxter had no colored copy but the birds which are from nature. I made him work from mere scratches in outline, in order to test his metal; and I feel confident that the public will agree with me in thinking it sterling. In carrying this very beautiful branch of the typographical art successfully into effect, Mr. B. has, I believe, completed what was the last project of the great Bewick, but which that truly original and admirable genius did not live to accomplish."

The Pulse.—Every one knows that among the numerous inquiries and examinations which precede the prescription of a careful physician, the state of the pulse is never omitted; yet as it is probable that few of our readers are acquainted with the reasons for this inquiry, or, what is the same thing, with the facts to be learned from it, we think it may not be uninteresting if we enumerate some of the more prominent ones.

It is almost unnecessary to premise that by the pulse is meant the beat of an artery, and that the one commonly chosen for examination is the radial artery, which beats at the wrist. The first point generally attended to is the number of the beats; and since in this, as in all other medical questions, it is necessary to be acquainted with the state of health, in order to recognize any deviation from it, we must mention the ordinary frequency of the pulse at different ages. In the new-born infant, it is from 130 to 140 in a minute; but decreases in frequency as life advances; so that, in a middle-aged adult in perfect health, it is from 72 to 75. In the decline of life, it is slower than this, and

falls to about 60. It is obvious that if we could suppose a practitioner ignorant of these plain facts, he would be liable to make the most absurd blunders, and might imagine a boy of ten to be laboring under some grievous disease, because his pulse had not the slow sobriety of his grandfather's. A more likely error is to mistake the influence of some temporary cause for the effect of a more permanent disease: thus, in a nervous patient, the doctor's knock at the door will quicken the pulse some 15 or 20 beats in a minute. This fact did not escape the notice of the sagacious Celsus, who says, "The pulse will be altered by the approach of the physician, and the anxiety of the patient doubting what his opinion of the case may be. For this reason, a skilful physician will not feel the pulse as soon as he comes; but he will first sit down with a cheerful countenance, and ask how the patient is,—soothing him, if he be timorous, by the kindness of his conversation, and afterwards applying his hand to the patient's arm." —(De Medica, lib. iii. cap. 7.*)

Granting, however, that these sources of error are avoided, the quickness of the pulse will afford most important information. If in a person, for example, whose pulse is usually 72, the beats rise in number to 98, some alarming disease is certainly present; or, on the other hand, should it have permanently sunk to 50, it is but too probable that the source of the circulation, the heart itself, is laboring under incurable disease, or that some other of the great springs of life is irremediably injured.

Supposing, again, the pulse to be 72, each beat ought to occur at an interval of five-sixths of a second; but should any deviation from this rhythm be perceived, the pulse is then said to be irregular. The varieties of irregularity are infinite; but there is one so remarkable as to deserve particular mention. It will happen sometimes that the interval between the two beats is so much longer than was expected, that it would seem that one beat had been omitted; in this case the pulse is said to be an intermittent one. When the action of the heart is irregular, the beat of the pulse is so likewise; but it will occasionally happen that the latter irregularity takes place without the former one, from some morbid cause existing between the heart and the wrist. It is hardly necessary to observe, that, in all doubtful cases, the physician examines the pulsation of the heart as well as that of the wrist,—just as the diligent student, discontented with the narrow limits of provincial information, repairs to the metropolis to pursue his scientific inquiries.

The strength or feebleness of the pulse, its hardness or softness, and innumerable other qualities might be discussed here; but, from the great difficulty attending any examination of these points, and the technical niceties involved in any thing more than a bare mention of them, we omit them. There is one point, however, which it would be unpardonable to pass over in silence: sometimes no pulsation can be felt at the usual part of the wrist. This may proceed from so great a languor of the circulation, that it is imperceptible at the extremities; or from the radial artery (the one usually felt) being ossified; or from an irregular distribution of the arteries of the fore-arm.

* The lapse of eighteen centuries has not destroyed the utility, much less the beauty, of the eight books on Medicine bequeathed by Celsus to posterity; they are unrivalled for perspicuous elegance and laconic good sense. Celsus is one of the writers of the Augustan age, and is worthy of the times in which he flourished.

Effect of Oil on Water.—The following is a secret worth knowing: In rough weather they (the fishermen of the Bosphorus) spread a few drops of oil on the surface, which permits them to see clearly to a great depth. I was aware that oil would calm the surface of the sea; but until recently I did not know that it rendered objects more distinct beneath the surface. A trinket of some value had been dropped out of one of the upper windows of our palace into the Bosphorus, which at this place was 10 or 12 feet deep. It was so small that dragging for it would have been perfectly useless, and it was accordingly given up for lost, when one of the servants proposed to drop a little oil on the surface. This was acceded to, with, however, but faint hopes of success. To our astonishment, the trinket immediately appeared in sight, and was eventually recovered.—[Dr. Dekay.]

Vegetable Silk.—There is at present considerable activity in a new branch of industry at Paris. We allude to the manufacture of carpets, and various other articles of general use, from a substance first imported into France by M. Pavy, to which he has given the name of vegetable silk. This substance has, in fact, an appearance very similar to that of silk, and can be employed as its substitute in a variety of cases. It is white, and can receive dye of any color. This vegetable is gathered in shoots of from 15 to 20 feet in length, and is of such strength that four of its shoots plaited together will bear a weight of 40 pounds.—[Balt. Gaz.]

Steam Carriages.—The select committee appointed last session of Parliament, on the motion of Colonel Torrens, conclude their report with the following summary of the result of their inquiries:—1. That carriages can be propelled by steam on common roads, at an average rate of ten miles per hour. 2. That at this rate they have conveyed upwards of fourteen passengers. 3. That their weight, including engine, fuel, water and attendants, may be under three tons. 4. That they can ascend and descend hills of considerable inclination with facility and ease. 5. That they are perfectly safe for passengers. 6. That they are not (or need not be, if properly constructed,) nuisances to the public. 7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses. 8. That as they admit of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such carriages will

cause less wear of roads than coaches drawn by horses. 9. That rates of toll have been imposed on steam-carriages which would prohibit their being used on several lines of road, were such charges permitted to remain unaltered.—[New Monthly Magazine.]

Harlem Railroad.—One of the most interesting rides which both citizens and strangers can take in this city, is that on this railroad. For 12½ cents a ride of five miles to Yorkville is obtained. It is true that the route affords no beautiful view of cultivated fields and gardens, but conveys an idea of the great amount of labor bestowed in cutting the track through hills of solid rock from 20 to 60 feet high, affording a correct idea of the geological structure of the island. At the termination of the ride is a spacious hotel, on very elevated ground, affording one of the most extensive, varied, and richest prospects to be seen in our country.

Inland Navigation.—From the New-York Observer, we make an extract from the proceedings at the recent anniversary of the Seamen's Friend Society.

Mr. Peet, in moving the second resolution, presented an interesting statistical view of the canals, rivers, lakes, and inland navigation, of the great west. In New-York alone, he said, the canals now completed and in operation extend 500 miles through a populous country, having on their banks 100 villages and cities, and bearing on their bosom 1,800 boats, navigated by between 10 and 12,000 men. The great lakes were also navigated by numerous large vessels, the number on lake Erie alone being 170, including 30 steamboats. Passing through these lakes, and the Ohio canal, on which the number of boats and boatmen is increasing with great rapidity, we come to the river Ohio, which stretches a thousand miles through a fine country to the Mississippi, the father of rivers, with its twenty-three tributaries, affording navigation for 8000 miles in various directions. The whole line of inland navigation in the United States, including canals, rivers, and lakes, Mr. P. estimated at 20,000 miles, and the whole number of boats employed on these waters at between 6 and 7,000, viz. 4,000 flat boats, 2,000 canal boats, between 3 and 400 steamboats, and 200 sloops and schooners. The number of men employed in Inland navigation is 60 or 70,000, and the number of passengers transported annually is more than 200,000.

Railroads in Tennessee.—Extract of a letter to the Editor of the Railroad Journal, dated

Nashville, May 2, 1834.

Dear Sri,—A constant employment during all the winter, in reconnoitering different routes for railroads in the western part of the State of Tennessee, prevented me from giving you any account of the situation of the internal improvements in that State. The companies being now organised, the officers elected, and the stock subscribed, I take the advantage of my first leisure hour to send you my two reports to the stockholders of the Jackson and Columbia Companies.

In January last, stock to the amount of $500,000 was subscribed for a line of railroad to the Mississippi river, and in March a like subscription was made for another line, in the same direction, from Columbia, Maury county, to the Tennesee river; and as, by the charter of the Jackson Company, they have a right to extend their road in the western districts, increasing the stock to the amount of one million of dollars, the two roads will be soon connected by an intermediate line.

I examined all the country, and furnished the companies with estimates of the probable cost of the work, and it is on account of those reports that the stock has been so liberally subscribed. In Jackson the commissioners were obliged to strike out $430,000, the amount subscribed over the capital of the Company, thereby reducing the subscription of the largest stockholders to 159 shares each.

East Tennessee has had a charter for a railroad since 1831, and is now making preparation to join the west in improving the internal communication of the State; and I can assure you, that within 6 or 7 years an uninterrupted communication will be opened between New-York and New-Orleans, either by the Valley of the Clinch, through Abingdon, Virginia, joining the Petersburg railroad, or through the Valley of the French Broad, by Ashville, North Carolina, joining Athens, Georgia, or Hamburgh, South Carolina, by which the mail will be carried over the route in 5 or 6 days.

A railroad through the centre of the State of Tennessee will be of inestimable advantage, not only to that State, but to the whole Union, as it will be the great rendezvous of all the emigrants to the Valley of the Mississippi, affording a speedy and easy transportation; opening the markets of the north-east and south-west for the products of her rich soil and mild climate, so well calculated for wheat, hemp, tobacco, and cotton; and also for her inexhaustible quarries of marble, beds of coal, veins of ore of every metal, found amongst her beautiful and picturesque mountains.

I am sincerely yours, &c.

J. B. Petitval, Civil Engineer.

Railroad across the Isthmus of Panama.—A subscription of $90,800 had been made in Panama for the construction of a railroad from Porto-Bello to Panama, i. e. from the Pacific to the Atlantic. The speedy achievement of the undertaking was considered certan.

A gentleman by the name of Ventura Marrouin, has discovered a passage from Cruces to Porto-Bello, i. e. from sea to sea, in a great measure free from hills, which can be accomplished, and which he has actually accomplished, in *less than one day.* The paper before us anticipates immense advantages from this discovery, and says it will be one of the most splendid triumphs which the Isthmus could achieve for commerce and civilization. The authorities of Panama had sent a commission, accompanied by Mr. Marrouin, to explore more fully the route referred to.—[Jour. of Com.]

Dry Rot.—An officer of the navy, now dead, was informed by the Rev. G. Williams, of Rhicolos, in North Wales, that it had been found, from long experience, that the water in the reservoirs for supplying the precipitate pits at the copper-mine works at Parry's mountain in Anglesea, has the property of preserving timber from decay and dry rot in a surprising manner, by the short process of steeping it therein a few weeks only, and that it has such a powerful effect in hardening the wood as to blunt the sharpest tools. It, consequently, is found necessary to shape and fit the wood completely for the use intended, before it is put into this water for seasoning.

The water at Parry's mine is impregnated with copper, sulphuric and vitriolic acids. It is preserved in large reservoirs for supplying the precipitate pits, which are filled with old iron, that attracts the copper from the water.

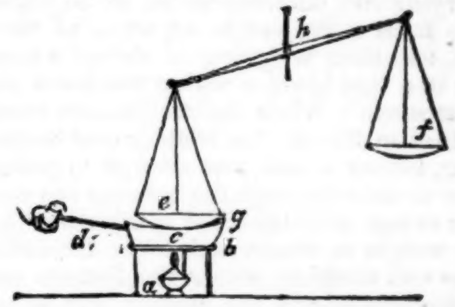
It appears that the farmers, when they find their timber for agricultural purposes too green for immediate use, steep it for a few days in the copper-water, which has the power of extracting the sap, and fitting it for use properly seasoned.

I understand that a complete transmutation takes place in the iron: it gradually becomes incrusted with the copper, whilst at the same time the acids act as a corrodent; so that a piece of iron thrown in, after a certain time, comes out copper, but whether weight for weight, or size for size, I do not recollect.

The Admiralty, I believe, are in the possession of this information; if, however, the present method of immersing ships and timber in sea-water is successful in curing or preventing the dry rot, we certainly cannot obtain a more easy or cheap method for gaining the desired end. The component parts of sea-water, common salt, marine magnesia, and salenite, are very dissimilar to those of the mineral waters of Parry's mine, and it will be curious if both, nevertheless, produce the same effect upon wood.—[U. S. Journal.]

Materials for Paper.—By a series of experiments I have ascertained that *paper*, of an excellent quality, can be prepared, not only from the husks of Indian corn, but also from a pulp made from various kinds of wood and bark, particularly from the bark of several kinds of poplar, and from the wood of birch and some other trees. In conducting my experiments, my plan has been first to select the vegetable matter; then, if it required whitening, to bleach it in chlorine gas, and afterwards to reduce it to a fine pulp, by pounding, and filing in water. When properly prepared, I would place a small portion of the pulp between polished steel plates, slightly warmed, and strongly compress them by screw power; the degree of consistency and polish assumed by the pulp, under such compression, would indicate the quality of paper capable of being prepared from the vegetable matter used. I trust that the time will soon arrive, when rags will not be considered as indispensable in the manufacture of paper, and will be, when economy or convenience requires it, superseded by different kinds of vegetable substances, which are so cheaply, bountifully, and universally furnished by nature.

Tests of the Texture of Soils.—One of the best methods of ascertaining the capability of any soil to take up and retain moisture, is that described by Mr. C. Johnson, for which purpose he employs the following apparatus.



a, is a small lamp; *b*, a stool, with a hole in the seat for receiving *c*, a shallow tin vessel, closely covered, but having a pipe, *d*, for the escape of steam; *h* is a pair of accurate scales, such as are used by apothecaries and goldsmiths. In order to employ this apparatus, put a small quantity of the soil to be tried upon the top of the tin vessel, in which water is kept briskly boiling for about half an hour, so as to thoroughly dry the soil by expelling its moisture. Take ten grains accurately weighed of this dried soil, and add to it, by means of a quill, a drop or two of pure water; if distilled water can be had, so much the better. Weigh the whole a second time, which will now be a few grains above ten. Take out the weight of the water from the scale, leaving in the weights of the dried soil, and suspend the beam, so that the scale *e* may rest on the lid of the tin vessel, the water in which it is still kept boiling; then with a stop watch note the exact time which the added water takes to evaporate, as will be shown by the beam of the balance becoming level. Mr. Johnson found, that soils requiring less than twenty-five, or more than fifty minutes, to evaporate the added water, and bring the balance to a level, were always proportionally unproductive; the first, from having too much flinty sand, and consequently too few interstices to allow the water to escape.

Rich soil, treated in this way, required thirty-two minutes to bring the beam to a level; chalk, twenty-nine minutes; poor flinty soil, twenty-three minutes; and gypsum, only eighteen minutes.

A very fertile soil from Ormiston, Haddingtonshire, containing, in 1000 parts, more than half of finely-divided materials, among which were eleven parts of limestone soil, and nine parts of vegetable principles, when dried in a similar way, gained eighteen grains in an hour, by exposure to moist air, at the heat of sixty-eight degrees Fahrenheit; while 1000 parts of a barren soil, from Bagshot Heath, gained only three grains in the same time.

Mr. Johnson farther found that one hundred parts of burnt clay, when exposed in a dry state for three hours to air saturated with moisture at sixty-eight degrees, took up twenty-nine

parts of water; that gypsum, in similar circumstances, took up only nine parts, and chalk only four parts.

Another method of testing the texture of soils is by taking what is termed their specific gravity; that is, comparing what they weigh in air with what they weigh in water. Sufficient accuracy for practical purposes may be obtained by drying two different soils, at an equal distance from a fire, or in an oven, at the same time, and then weighing in the air a pound of each in a thin bladder with a few holes near its top, or neck. When the weight has thus been obtained in the air, the bladder may be put into water, letting it sink low enough to permit the water to enter through the holes in the neck, in order to mix with the dried specimen of the soil. The weight in water, divided by the difference of the two weights, will be the specific gravity, and the less this is, the greater will be the capacity of the soil to take up and retain water. Muschenbroek thus found rich garden mould to be 1630 compared to 1000 of water, and Fabroni found a barren sand to be 2210 compared to 1000 of water.

Or fill a wide necked pint or quart bottle half full with water, and add the soil to be tried till the water rises to the brim. Then if the bottle can contain one pound of water, and gains half a pound additional when filled in this way, half with water and half with soil, the soil thus tried will be twice as heavy as water, and its specific gravity will be two. If it only gain a quarter of a pound, its specific gravity will only be one.

M. Giobert ascertained that a pound of fertile soil contained, of flinty sand, about 4,400 grains, of clay about 600 grains, of lime about 400, besides seventy of water, and about twenty-five grains of inflammable materials, chiefly carbon. On a comparative trial of a barren soil, M. Giobert found that a pound weight contained about 600 grains of clay, about 400 grains of lime, and little or no inflammable materials. Mr. Grisenthwaite directs an equal portion of two soils, perfectly dry, to be introduced into two tall glasses, in the midst of each of which a glass funnel has been previously placed. The soils are to be put in so as to retain, as nearly as possible, their natural state when in the ground, and are consequently not to be too much pressed down. When this has been done, water is to be poured very gradually into each of the funnels, and it will rise up as it does in a piece of lump sugar into the dry soil, as may be seen through the glass. The more rapidly the water is seen to rise, the better will be the texture of the soils.—[Professor Rennie.]

Patent for a Thrashing Machine: James Hart, and Waller S. Holladay, Spottsylvania, Va., September 17.

This patent is taken for the manner of constructing the cylinder and concave, which is as follows: A square bar of iron is to form the shaft of the cylinder; the gudgeons, of course, being rounded. Flat bars of iron, from sixteen inches to two feet in length, are to have square holes made through their centres, so that they will slip on to the shaft. One of them is to be put on, and against it a circular piece of plank, four inches less in diameter than the length of the bar, leaving the latter to project two inches, to form teeth, or beaters; the plank, by its thickness, regulating the distance of the teeth. A second bar is to be placed against this plank, at right angles to the former, then another plank and another bar, until there are enough for the length of the cylinder. For the sake of greater firmness the bars are let into the plank; and to keep the whole together, four screw bolts are to pass from end to end of the cylinder, through the plank and bars. The concave is to be placed above the cylinder, and to be formed of plank, with projecting teeth, on the same principle.

There is no claim made, but as the whole description consists in the manner of constructing the cylinder and concave, the object of the patent is sufficiently apparent.

Patent Thrashing Machine: Linus Yale, of Otsego, and Philo C. Curtis, of Utica, Oneida county, N. Y., September 17.

The concave is to be a semicircular trough of cast iron, supported on suitable legs, and having rows of teeth projecting from its interior. The cylinder is to be made by bending round, and brazing, or riveting, sheet iron of one-eighth of an inch in thickness. This is to be set with teeth of iron, or steel, and to have wooden or iron heads to receive a shaft, which revolves in boxes at the ends of the semicircular concave.

The claim is to the cast iron frame, the sheet iron cylinder, and the form of the spikes, or cogs, and manner of fastening them into the cylinder.

Anatomy of the Horse's Foot.—The horse, a native of extensive plains and steeps, is perfect in his structure as adapted to these his natural pasture grounds. When brought, however, into subjection, and running on our hard roads, his feet suffer from concussion. The value of the horse, so often impaired by lameness of the foot, has made that part an object of great interest; and I have it from an excellent professor of veterinary surgery to say, that he has never demonstrated the anatomy of the horse's foot without finding something new to admire. The weight and power of the animal require that he should have a foot in which strength and elasticity are combined. The elasticity is essentially necessary to prevent percussion in striking the ground; and it is attained here, through the united effect of the oblique position of the bones of the leg and foot—the yielding nature of the suspending ligament, and the expansibility of the crust or hoof. So much depends on the position of the pastern bones and coffin bone, that, judging by the length of these and their obliquity, it is impossible to say whether a horse goes easily, without mounting it. When the hoof is raised, it is smaller in its diameter, and the sole is concave; but when it bears on the ground it expands, the sole descends so as to become flat-

ter; and this expansion of the hoof laterally is necessary to the play of the whole structure of the foot. Hence it happens that if the shoe be nailed in such a manner as to prevent the hoof expanding, the whole interior contrivance for mobility and elasticity is lost. The foot in trotting comes down solid, it consequently suffers percussion; and from the injury, it becomes inflamed and hot. From this inflammation is generated a variety of diseases, which at length destroy all the beautiful provisions of the horse's foot for free and elastic motion. The subject is of such general interest, that I may venture on a little more detail. The elastic or suspending ligament spoken of above passes down from the back of the canon bone, along all the bones, to the lowest, the coffin bone; it yields and allows these bones to bend. Behind the ligament the great tendons run, and the most prolonged of these, that of the perforans muscle, is principally inserted into the coffin bone, having at the same time other attachments. Under the bones and tendon, at the sole of the foot, there is a soft elastic cushion; this cushion rests on the proper horny frog, that prominence of a triangular shape which is seen in the hollow of the sole. The soft elastic matter being pressed down shifts a little backwards, so that it expands the heels, at the same time that it bears on the frog, and presses out the lateral part of the crust. We perceive that there is a necessity for the bottom of the hoof being hollow or concave—first to prevent the delicate apparatus of the foot from being bruised, and, secondly, that elasticity may be obtained by its descent. We see that the expansion of the hoof and the descent of the sole are necessary to the play of the internal apparatus of the foot. That there is a relation between the internal structure and the covering, whether it be the nail, or crust, or hoof, we can hardly doubt; and an unexpected proof of this offers itself in the horse. There are some very rare instances of a horse having digital extremities. According to Suetonius, there was such an animal in the stables of Cæsar; another was in the possession of Leo X.; and Geoffrey St. Hilaire, in addition to those, says, that he has seen a horse with three toes on the fore foot, and four on the hind foot.* These instances of deviation in the natural structure of the bones were accompanied with a corresponding change in the coverings—the toes had nails, not hoofs. By these examples it is made to appear still more distinctly, that there is a relation between the internal configuration of the toes and their coverings; that when there are five toes complete in their bones, they are provided with perfect nails—when two toes represent the whole, as in the cleft foot of the ruminant, there are appropriate horny coverings—and that when the bones are joined to form the pastern bones and coffin bone, there is a hoof or crust, as in the horse, couagga, zebra, and ass. —[Bell's Bridgewater Treatise.]

* Such a horse was not long since exhibited in town and at Newmarket.

Oberlin Collegiate Institute.—We have given some notice of the origin and objects of this institution in a former number. From a recent circular we learn the following particulars.

The system embraces instruction in every department, from the Infant school to a Collegiate and Theological course. Physical and moral education are to receive particular attention. The institution was opened in December last, and has sixty students; about forty in the academic, and twenty in the primary department. All of them, whether male or female, rich or poor, are required to labor four hours daily. Male students are to be employed in agriculture, gardening, and some of the mechanic arts; females in housekeeping, useful needle-work, the manufacture of wool, the culture of silk, certain appropriate parts of gardening, &c. The Institution has five hundred acres of good land, of which, though a complete forest a year ago, about thirty acres are cleared, and sown with wheat. They have also a steam mill, and a saw mill, in operation. During the present year it is contemplated to add fifty acres to the cleared land, to erect a flouring mill, shingle machine, turning lathe, a work shop, with an extensive boarding house, (which together with the present buildings will accommodate about one hundred and sixty students,) furniture, farming, mechanic, and scientific apparatus; and begin a library.

During the winter months, the young men are at liberty to engage as agents, school teachers, or in any other occupation they may select. The expenses of students in the seminary for board at the table spread only with vegetable food, are eighty cents a week; and ninety-two cents a week for the same with animal food twice a day. Tuition is from fifteen to thirty-five cents a week. The avails of the students' labors have thus far varied from one to eight cents an hour. The average has been five cents. A majority of the male students have, by their four hours' daily labor, paid their board, fuel, lights, washing and mending, and some even more; and this without any interference with their progress in their studies.

The time to be spent at this Institution, in preparation for the various professions and employments of life, is not yet defined, nor a single course of study marked out as the only one through which an individual can attain a desired station. Diplomas are not to be given according to the time spent in study, but to the student's real acquirements.—[Annals of Education.]

We learn from the Annals of Education, that this plan of instruction is viewed very favorably in Georgia.

Power of Smelling in Birds.—A small pamphlet has been put into our hands by a friend, containing an account of some interesting experiments made at Charleston, South Carolina, during the winter, for the purpose of determining certain facts in the natural history

of the Vulture. The Turkey-Buzzard and the Carrion-Crow were the particular subjects of experiment, and the object was to determine whether they do in fact possess the extraordinary powers of smelling which have been so uniformly attributed to them by naturalists, and whether it is their habit to feed only on putrid meat.

Mr. Audubon was the first writer on American Ornithology, who denied the Vulture the faculty of smell, and maintained that it is guided by the eye only, in its search for food. The experiments by which he arrived at this opinion were published in 1826, and have been treated on both sides of the Atlantic, with severity, as unsatisfactory, and indeed palpably absurd. The pamphlet before us, written by Doctor Bachman, of Charleston, details a series of experiments, made for the express purpose of testing the correctness of Mr. Audubon's opinion. That gentleman was on a visit to Charleston, but took no part in them. They were witnessed by Robt. Henry, President of the College of South Carolina, Dr. John Wagner, Professor of Surgery of the Medical College of the State, Dr. Henry Frost, Professor of the Materia Medica, and C. F Leitner, Lecturer on Botany and Natural History, in the same institution, Dr. B. B. Strobel, and Martin Strobel, Esq. all gentlemen of eminent standing and capacity. They have unanimously signed a certificate, stating that from the experiments they have witnessed on the habits of the Vultures of Carolina, called the Turkey Buzzard and the Carrion Crow, they "feel assured they devour fresh as well as putrid food of any kind, and that they are guided to their food altogether through the sense of sight and not that of smell."

The result, besides its bearing on a material part of natural history, is a gratifying testimony to the scientific accuracy of Mr. Audubon, and a sufficient defence against the illiberal sneers with which his discovery has been treated. The experiments detailed show not only that those birds are without any particular strength of smell, but that they are destitute of the sense altogether. Among other proofs of this, it was found that they were attracted by coarse pictures of dead animals, and were unable to perceive flesh, which was only hidden by a piece of canvass, although standing upon it at the time. The experiments were varied in such a way as to make it impossible there should be any mistake. There can be no doubt that with respect to this part of the Vulture family, the opinions that have prevailed for so many centuries are erroneous.

Among the experiments was one to test the story, published lately,—that if the eye of the turkey-buzzard was put out by perforation, it would be restored, and the sight renewed by putting the head under the wing, the down of which was said to perform the miracle. They found that the ball of the eye is refilled, but the sight was not restored. They found, also, that a blind bird cannot perceive the most offensive animal substance, however near.—[Baltimore American.]

To increase the Strength and Firmness of Thread and Coarse Cloth.—The lixivium of oak has been employed for scarcely any other purpose than that of the tanner, and yet it is applicable to a great variety of uses. If thread, cords, nets, coarse linen, &c. be steeped in it, they acquire greater firmness and durability. Fishermen have long resorted to this. Nothing is more apt to spoil than skins, and yet this preserves them. It is the same with hempen and linen cloth: they contain much gummy and resinous matter, which, with tannin, forms an envelope, and thus adds to their durability. Linen ought not to steep more than eight or ten days in this solution: it acquires a very brown color. When this color fades, the operation may be repeated.

The best method of preserving nets and cordage is the following: Dissolve two pounds of Flemish glue in fifteen gallons of water, dip the nets, &c. into this solution, and then steep them in a strong solution of oak or chesnut bark,—the tannin combines with the gelatine, and forms, between the fibres of the hemp, a solid net work, which adds great strength to the cords. Any bark which contains tannin may be employed in making a decoction; so bones, parings of skin, remains of fish, &c. and generally all substances containing gelatine, may be used in making a gelatinous solution. Fishermen, who often throw away on the shore gelatinous fish, may use them for this purpose.—[Jour. des Connais. Usuelles.]

To temper Large Instruments.—W. H. Raiford, in the Southern Planter, says, some wrought iron ploughs will last twice as long as others. This is owing, in a great measure, to the tempering. It is in vain, he says, to attempt to temper large instruments, in a small quantity of impure water. The more and the purer the water the better will be the temper.

To take out Ink from Mahogany.—Wet a piece of blotting paper, rolled into a ball, and rub the table with it. Afterwards rub the places where the ink was with a dry cloth.

Preservation of Skins.—J. Stegard, tanner at Tyman, in Hungary, completely preserves raw hides from putrefaction, and restores those that are tainted, by applying to them, with a brush, a layer of pyroligneous acid. They absorb it very speedily, and it occasions no injury nor diminution of their value.—[Receuil Industrielle.]

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